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NOTES AND LITERATURE.

GENERAL BIOLOGY.

Lloyd and Bigelow's Teaching of Biology.[1]— In the joint volume by Professors Lloyd and Bigelow, on the teaching of biology in the secondary schools, the first half of the book, under the sub-title "The Teaching of Botany and Nature Study," comprising some 320 odd pages divided into ten chapters, is by Professor Lloyd. The style, while at times a little abrupt, is convincing and forceful, and much sound common sense is inculcated in this presentation of the subject. The introductory chapter is of the nature of a general exposition of the value of science in education and of the sciences the especial value of biology. The author brings out clearly the importance of biological training, not only from the facts which it teaches, but also, what is more essential, the discipline which it affords. The nature study side of the question is first considered since that subject is first demanded in the schools at the present time. Here we find strong arguments for the necessity of intellectual honesty and against that curse of nature study, sentimentalism. The pitfalls which lie in the way of teachers, in the confusion of teleological and causal interpretations of organic structures, are dwelt upon.

The subject of botany itself is begun in the following chapter and the various aspects of the subject developed in the subsequent ones. The greatest interest perhaps centers in the discussion of the different types of botanical courses. Every modern botanist must agree with the author in his advocacy of a dynamic point of view, rather than the formal morphological one which arises from a lack of a proper consideration of the physiological side of the subject. While the necessity of some study of types is recognized, very cogent and just criticisms are made of the extreme "type course," criticisms, indeed, which apply not only to biology as taught in schools, but also as taught in colleges.

The starting point for a botanical course will always be a moot question and must necessarily depend in a measure on the individual teacher and the conditions under which he works. Here the fruit is advocated as the point of departure, from which the student naturally passes to the study of the seed and seedling, till finally the fully developed plant and its organs are all taken up. In connection with the necessary morphological and anatomical study, the physiology and, to an adequate extent, the ecological relations of the plant, are brought out. The author's attitude towards ecology will be appreciated by many, for without in any sense undervaluing its interest and importance he subordinates it so that it is not made the only end and aim of botanical instruction. The consideration of types follows, but the transition seems a little abrupt from what has gone before. Whether, in the time usually available in schools, the students could with advantage study such obscure forms as Myxomycetes, must be a question.

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[1] Lloyd, F. E. and Bigelow, M. E. *The Teaching of Biology in the Secondary Schools.* New York, Longmans. 1904. American Teachers Series. 8vo, viii + 491 pp.

The value of the book as a whole, to teachers, particularly to those who have not had the advantage of adequate preparation, cannot but be great. It is essentially not a book which deals with fads, the importance of nature study under the conditions which exist is recognized without exaggerating this importance, the use of botanical instruction proper in higher schools is justified with reasonable moderation. The attitude of the author towards essential questions is wholesome and stimulating. While enthusiasm of the best kind is strongly advocated, sentimentalism is frowned upon, honesty of thought and of observation is insisted upon. The dynamic point of view, already referred to, that plants should be considered as living organisms and not merely as aggregations of cells and tissues arranged in interesting patterns, or as objects to be placed in hard and fast categories, will undoubtedly serve to stir up those who tend to fall into a too formal conception of botany ; and the need of such stimulus when the great mass of botanical instruction the country over is considered, is probably almost as great as ever. Another point of value is the warning against unreasoning acceptance of teleological and causal interpretations, which bring about false conceptions of the significance of structures. The great value of the book then is in this plain straightforward attitude and the desire to avoid and show others how to avoid, question begging ideas of form and of function. As to the particular form of a botanical course for secondary schools it is not necessary to assume any finality in the arrangement suggested, nor is it necessary for the teacher to follow exactly the plan adopted, to be able to get a very useful stimulus from the book.

Practical notes as to laboratory equipment and so forth, conclude Professors Lloyd's part of this volume and it should also be mentioned that at the head of each chapter copious and usually pertinent references are given to articles and books which the reader may desire to consult.

The second part of the book, entitled "The Teaching of Zoölogy in the Secondary Schools," covers some 248 pages arranged under twelve chapters, and is by Professor Bigelow. In the first chapter the aims of zoölogical teaching are discussed from the standpoint of the secondary school and emphasis is laid on the importance of zoölogy as a means of training the mind as well as an informational subject. In discussing available matter for zoölogy Professor Bigelow advocates a partial return to the study of internal anatomy, including dissection, from which in the last ten years the secondary schools have tended to withdraw. It is questionable whether this proposal is sound, for, notwithstanding laboratory pretensions, the teacher of zoölogy is bound to impart most of his knowledge by authoritative statement rather than by demonstration and hence he may draw his laboratory material from the many illustrations in external anatomy rather than from internal dissection so often objectionable to the pupil.

The importance of animal ecology, classification, embryology, palæontology, and evolution are reasonably urged but with the final apology that perhaps these aspects of zoölogy, good in themselves, are for want of time not possible in the school. If, however, we understand Professor Bigelow aright the pupil is not to be treated in such a way as to bring him to the state of a "finished" product at the end of his school life, but he is to be turned out with a mind trained for mental work and awakened by a flood of suggestions that will lead him in later years to take an active interest in the intellectual life about him. From this standpoint few subjects are more important than ecology, palæontology, and evolution.

Good advise based upon actual experience is contained in the chapter on laboratory method, and the advantages of the "verification" and "investigation" methods are set forth so well that even the strongest advocates of the latter must see that theirs is not the only path to true knowledge. The conception of school "physiology" as a special application of zoölogy and its importance in connection with this science is justly emphasized and ought to lead to a radical reform and betterment in the teaching of this subject. The zoölogical text, like that of the botanical portion, is accompanied by copious references and list of books, a feature which alone makes the volume of great importance to the teacher.

One feature in the present situation of biological teaching is apparently not dwelt upon and that is the importance of high grade teachers for such work. Doubtless this is taken for granted, but it is certainly too true that the subjects included under biology are often forced as side work upon uninterested teachers with the result that the poor outcome is too frequently attributed to the subject rather than to the conditions under which it is taught. As a whole the volume is an unusually sound body of suggestion and advise which no teacher of school biology can afford to be without.

R. & P.

ZOÖLOGY.

A New Textbook of Zoögeography.[1] — Professor Arnold Jacobi of the Forestry Academy at Tharandt, Saxony, has lately published a small manual. It is with much pleasure and satisfaction that we have read this little work, since it is the first general treatise of the subject which pays due attention to the modern improved ideas with regard to zoögeographical methods.

While all previous textbooks on this subject generally fall more or less in line with Wallace's method, giving chiefly an account of the present conditions of animal distribution upon the earth's surface, and being satisfied with the creation of a "scheme" of animal distribution, Jacobi makes it the fundamental idea of his book, that the creation of "schemes of distribution" is not the final goal of zoögeographical research, but only a means to facilitate it. He adopts the view that no scheme whatever is able to explain all cases, that it is possible to create different schemes for different groups of animals, and that even then there are exceptional cases, which need further research. That these exceptional cases very often find their explanation in the geological history of the particular group to which they belong, is also maintained by him, and he most emphatically declares this latter study the most important branch of this science. Thus he fully accepts the general principles of zoögeography as set forth repeatedly by Ortmann.

The limited space alloted for the work made it impossible for the

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[1] Jacobi, A. *Tiergeographie* (Sammlung Goeschen). Leipzig, 1904. 12°. 152 pp., 2 maps.